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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/619,203   | 07/14/2003  | Chee Wei Wong        | MIT.9721            | 6373             |
| 55740  | 7590        | 02/23/2006           | EXAMINER            |                  |
| GAUTHIER & CONNORS, LLP<br>225 FRANKLIN STREET<br>BOSTON, MA 02110 |             |                      | KANG, JULIANA K     |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 2874                |                  |

DATE MAILED: 02/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                      |                                    |  |
|------------------------------|--------------------------------------|------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/619,203 | <b>Applicant(s)</b><br>WONG ET AL. |  |
|                              | <b>Examiner</b><br>Juliana K. Kang   | <b>Art Unit</b><br>2874            |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 December 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

1. Applicant's communication filed on December 2, 2005 has been carefully studied by the Examiner. The arguments advanced therein, considered together with the amendments made to the claims, are not persuasive. This action is made final.

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "high dielectric contrast" in claims 1 and 11 is a relative term which renders the claim indefinite. The term "high dielectric contrast" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Thus it is not clear to the Examiner what applicant means by providing high dielectric contrast with air.

***Claim Rejections - 35 USC § 102***

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1, 5-7, 10, 11, 15-17, and 20 are rejected under 35 U.S.C. 102(a) as being anticipated by Matsuura et al (WO 02/10843 A2, submitted by applicant).

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Regarding claims 1 and 11, Matsuura et al disclose a photonic device comprising a membrane structure (support, Matsuura et al show the support structure that changes shape in Fig. 4) that can experience strain (see page 7 lines 2-9) using a plurality of thin-film actuators (see page 8 line 11 and page 15 lines 29-33); and a waveguide element formed on said membrane structure so that when said membrane structure is strained, said waveguide element is tuned to a selective amount (see page 6 lines 16-22, page 9 lines 20-24). Matsuura et al further disclose using dielectric material for the support (see page 6 lines 30-32) and thus the support provides dielectric contrast with air underneath the support.

Regarding claims 5-7 and 15-17, Matsuura et al disclose 1-dimensional and 2-dimensional photonic crystals (see page 8 line 29) comprising holes (air, see page 12 line 15).

Regarding claims 10 and 20, Matsuura et al disclose using piezoelectric to produce strain (see page 6 line 31).

Please note, regarding the method claims above, that method claims parallel article claims exactly without the introduction of any particular manufacturing methods, sot that it is proper to examiner the article and method claims together.

### ***Claim Rejections - 35 USC § 103***

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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7. Claims 2 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuura et al and further in view of Caracci et al (U.S. Patent 6,445,838 B1).

Matsuura et al disclose using silicon-based substrates that can be physically deformed due to piezoelectric response but does not explicitly teach SiO<sub>2</sub> layer. Caracci et al that silica is expandable in response to the stimulus of heat or a piezoelectric material which is expandable in response to the stimulus of voltage. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use silicon based substrate such as SiO<sub>2</sub> in Matsuura et al as taught by Caracci et al to tune the waveguide element.

8. Claims 3, 4, 8, 9, 13, 14, 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuura et al.

Regarding claims 3, 4, 13 and 14, as described above Matsuura et al disclose the claimed invention except the waveguide that comprises a microring or miroracetrack resonator. Since Matsuura et al teach using the device a resonators it would have been obvious to one with ordinary skill in the art at the time the invention was made to use Matsuura et al's device in any well known resonator such as a microring or microracetrack resonator.

Regarding claims 8, 9, 18 and 19, as described above Matsuura et al disclose the claimed invention except the claimed strain approximately 1% or 0.2%. Matsuura et al tuning of photonic crystal by stressing the membrane permits precise control of light traveling through the photonic bandgap waveguide (see page 3 lines 24-27, page 6 lines 1-8, and page 8 lines 26-30). Since Matsuura et al provide the same claimed

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structure and also teaches tuning of the photonic crystal precisely, it would have been obvious to one having ordinary skill in the art at the time the invention was made to tune the device with any desired tuning including the claimed tuning of approximately 1% or 0.2%, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

Please note, regarding the method claims above, that method claims parallel article claims exactly without the introduction of any particular manufacturing methods, so that it is proper to examine the article and method claims together.

### ***Response to Arguments***

9. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., photonic crystals and microphotonic element that do not exhibit piezoelectric effects) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant also argues that Matsuura et al do not teach forming a waveguide on a deformable element for tuning. The Examiner does not agree with this. Matsuura et al clearly teach dimensional change of the support (substrate, see page 16 lines 2-3).

***Conclusion***

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juliana K. Kang whose telephone number is (571) 272-2348. The examiner can normally be reached on Monday through Thursday 8:00 AM-2:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rod Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**JULIANA KANG**  
**PRIMARY EXAMINER**

2/21/06